

CLAIMS

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1. A method for processing a digitally encoded multimedia stream of data that is in packets to prevent underflow of a decoder buffer of a predetermined size, each frame having a presentation time stamp and a decoding time stamp, said method comprising the steps of:
 - a) determining a potential data underflow for said decoder buffer when said decoder buffer is less than said predetermined size;
 - b) adding a predetermined value to said presentation time stamp when said potential data underflow is determined in step a); and
 - c) adding said predetermined value to said decoding time stamp when said potential data underflow is determined in step a);whereby a buffer underflow of said decoder buffer is prevented.
 2. The method as defined in claim 1 wherein said digitally encoded multimedia stream of data is an MPEG-2 transport stream.

1 3. The method as defined in claim 1 wherein said processing a
2 digitally encoded multimedia stream of data includes
3 processing prior to transmission in order to prevent decoder
4 buffer underflow.

1 4. The method as defined in claim 1 wherein said processing a
2 digitally encoded multimedia stream of data includes
3 processing prior to transmission, multiplexing, and splicing
4 said digitally encoded transport stream of data in order to
5 prevent decoder buffer underflow.

1 5. The method as defined in claim 1 wherein said step of
2 determining said potential data underflow for said decoder is
3 performed by a process of emulation.

1 6. The method of claim 4 wherein said digitally encoded
2 transport stream is an MPEG-2 transport stream.

1 7. The method of claim 1 wherein said predetermined value added
2 to said presentation time stamp is an amount T determined by
3 the relationship:

4
$$T = (B - x) / [S * (P - H) / P]$$

5 where: B = the size of said decoder buffer;
6 x = the size of said current buffer;
7 S = the bit rate of said transport stream;
8 P = a uniform size of said packets; and
9 H = a minimum header size for each of said packets.

1 8. The method of claim 8 wherein said buffer level is x, said
2 packets have a uniform size P and each packet has a minimum
3 header size H, a maximum number of null packets deleted is by
4 the relationship:

5
$$N = (B - x) / (P - H)$$

6 where: N = a number of packets;
7 B = the size of said decoder buffer;
8 x = the size of said current buffer;
9 P = a uniform size of said packets; and
10 H = a minimum header size for each of said packets.

1 9. In a method for transmission, multiplexing, and splicing
2 a digitally encoded transport stream, said stream
3 having packets with a presentation time stamp and a
4 decoding time stamp, and said method being adapted
5 for use with a decoder buffer of a predetermined
6 size, an improvement comprising the steps of:

7 a.) determining by emulation prior to transmission
8 that a potential decoder underflow would occur
9 after a splice proposed at a predetermined
10 time; and

11 b.) when a potential underflow is determined in
12 step (a), deleting null packets prior to the
13 time proposed for the splice and recomputing
14 an earlier splice time whereby buffer
15 underflow is prevented.

1 10. The method as defined in claim 9 wherein said digitally
2 encoded multimedia stream of data is an MPEG-2 transport
3 stream.

1 11. The method as defined in claim 9 wherein said step of
2 determining said potential data underflow for said decoder
3 is performed by a process of emulation.

1 12. In a method for transmission, multiplexing, and splicing a
2 digitally encoded transport stream to prevent buffer underflow
3 of said stream including packets each having a presentation
4 time stamp and a decoding time stamp, said method being
5 adapted for use with a decoder buffer of a predetermined size,
6 said method comprising the steps of:

- 7 a) determining a potential underflow when the current
8 buffer size is less than said predetermined amount;
- 9 b) adding a predetermined value to said presentation
10 time stamp, when a potential underflow is determined
11 in step (a); and
- 12 c) adding said predetermined value to said decoding
13 time stamp, when a potential underflow is
14 determined in step (a);

15 whereby buffer underflow is prevented.

1 13. The method as defined in claim 12 wherein said step of
2 determining said potential data underflow for said decoder
3 is performed by a process of emulation.

1 14. The method as defined in claim 12 wherein said processing a
2 digitally encoded multimedia stream of data includes
3 processing prior to transmission, multiplexing, and splicing
4 said digitally encoded transport stream of data in order to
5 prevent decoder buffer underflow.